PRESENTS: PRobing Early Stellar EvolutioN with asTeroSeismology

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The goal of this proposal is to discover and analyze pulsational variability in intermediate mass pre-main sequence (pre-MS) stars using the high-precision and high duty-cycle photometric time series obtained with the K2 mission.

Although we have a general concept of how stars are formed and evolve, our current knowledge of early stellar evolution is limited and contains a lot of unsolved questions such as the determination of pre-MS lifetimes and ages, and the speed of early stellar evolution. Young intermediate-mass stars with ~1 to 6 solar masses have similar atmospheric properties to their evolved counterparts in the (post-)main sequence phase. Hence, it is not possible to constrain the evolutionary stage of a given star by its atmospheric properties (i.e., effective temperature, surface gravity and luminosity) alone. As pre-MS stars differ from their more evolved analogues of same atmospheric properties mostly in their interiors, asteroseismology provides an independent method to constrain the evolutionary stage of a field star. It also allows investigating the relevance of various physical processes to early stellar evolution. An example for the enormous potential of the application of asteroseismic methods to pre-MS stars is described in our recent study (Zwintz et al. 2014, Science, 345, 550) where we revealed a first connection between the oscillation properties of pre-MS stars and their relative stage in the pre-MS evolution.

Here we propose to observe 10 previously identified intermediate mass pre-MS stars in fields 4 and 5 that lie in the effective temperature range between ~15 000K (spectral type B5) and ~6500K (spectral type F5) to search for SPB, delta Scuti and gamma Doradus type pulsations.